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A NEW SILURIAN PHYLLOPODOUS CRUSTACEAN

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The phyllopodous crustacean here described and illustrated was recently donated to the Museum by Mr. Floyd Markham who found it in the Silurian (Niagaran) shale excavated during the construction of the Calumet feeder for the Chicago Drainage Canal, a little southwest of Blue Island, Illinois. In this Niagaran shale is also found in large numbers a beautifully preserved geophyrean type of worm, *Lecthaylus gregarius* Weller (Weller, 1925, pp. 540-544; Roy and Croneis, 1931, pp. 234-242, pls. XLII-XLIV). In fact, *L. gregarius* is so characteristic of this shale that it may be conveniently termed "Lecthaylus shale." Further desirability for giving this shale a stratigraphical name is that it has, so far, yielded a very interesting fauna and it promises to contain other forms which might be of still greater interest than those hitherto found. The term, "Lecthaylus shale," therefore, is here used for further reference to this particular shale.

Lecthaylus shale is grayish brown and often dotted with dark blotches, apparently of organic origin. Its vertical extent has never been found to exceed two feet and its horizontal extent is not definitely known. Recently the writer has seen two isolated patches of this shale in the dump pile about a mile from where it was originally found, a fact which would indicate that the formation is continuous over a considerable area. The shale is fine grained, partially homogeneous, and calcareous (slightly dolomitic, the magnesian content being 25.70 per cent). It is overlaid and underlaid by a buff-colored dolomite of the Upper Lockport group, probably the Racine of eastern Wisconsin and equivalent to the Chert bed (Bed 12) of the Niagaran of Hamilton, Ontario, Canada (for detailed description and further reference, see Roy and Croneis, 1931, pp. 237-238, pl. XLII¹).

¹ In the explanation of pl. XLII, fig. 2, and on page 238 it has been mentioned that "S," representing interbeds of shale, is not fossil-bearing. This statement has been found to be erroneous. Fossils, although rare, do occur in these interbeds.

The writer here wishes to express his sincere thanks to Mr. Floyd Markham for the privilege and opportunity of describing this interesting crustacean. It belongs to the genus *Ceratiocaris*,¹ of which only one species has hitherto been reported from the Niagaran of North America.

The drawings are by the Staff Illustrator of Field Museum, Mr. Carl F. Gronemann.

SPECIFIC DESCRIPTION

Ceratiocaris markhami Roy sp. nov. Fig. 29a-e.

This species is represented by two nearly complete telson-spines, one belonging to an adult and the other to a very young individual. The present description is based on the larger of the two, the smaller one being too immature and its structural features too faintly outlined to be useful for descriptive purpose. Both were found embedded in the *Lecthaylus* shale in association with *Lecthaylus gregarius* Weller, a dendroid graptolite, *Desmograptus micronematodes* (Spencer), and *Conularia manni* Roy sp. nov. (S. K. Roy: Field Mus. Nat. Hist., Geol. Ser., 6, No. 10). The specimens, like the associated fossils, are almost completely carbonized, but much of the carbonized material has been shattered and has fallen off during the process of splitting the shale, leaving largely the impressions of the right and left lateral sides of the spines.

Description.—Long and narrow, compressed laterally through pressure along the median ridge, very gently curved, gradually tapering. Surface distinctly ribbed and grooved; ribs rounded to subangular, low, finely striated with a few scattered small ovoid markings indicating probable bases of spinules; grooves wide, shallow, and apparently unornamented. In addition to the scattered ovoid markings, minute lattice-like raised angular lines in the form of elongated subrhombs (fig. 29e) may be observed at the basal end of the telson under a lens. The ornamentations are not unlike the ones observed by Hall, in *Ceratiocaris deweyi* (Hall) (fig. 29f). He describes them as "imbricating, narrow, lanceolate, low elevations, which are obliquely striated." Similar ornamentations, some of which are reproduced in this paper (fig. 29f-k)² for comparison,

¹ For systematic classification see K. A. von Zittel, Text Book of Paleontology, 1, pp. 747-750, 1913.

² Fig. 29f, *C. deweyi* (Hall) (Hall, 1852, pl. 71, fig. 1c); g, *C. decipiens* Barrande (Barrande, 1872, pl. 21, fig. 38); h, *C. inaequalis* Barrande (Barrande, 1872, pl. 19, fig. 15); i, *C. scharyi* Barrande (Barrande, 1872, pl. 32, fig. 27); j, *C. leptodactylus* (McCoy) (Jones and Woodward, 1888, pl. 6, fig. 4c); k, *C. papilio* Salter (Jones and Woodward, 1888, pl. 11, fig. 4b).

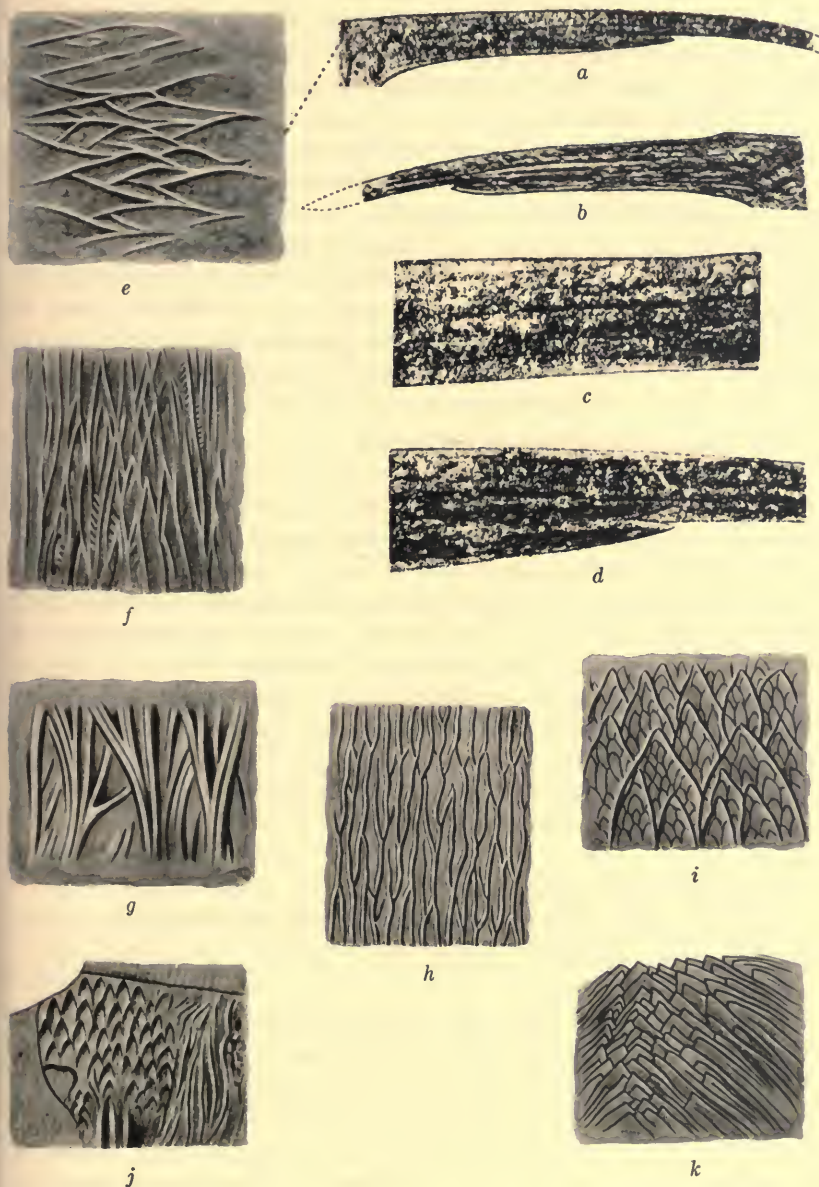


FIG. 29. *a*, Telson-spine (right lateral impression) of *Ceratiocaris markhami* Roy sp. nov. F.M. No. P23506. Natural size. *b*, Left lateral impression of same. F.M. No. P23506. Natural size. *c*, *d*, Enlargements of proximal and distal halves of same. *e*-*j*, Surface ornamentations of basal end of telsons of various species of *Ceratiocaris*: *e*, *C. markhami* Roy; *f*, *C. deweyi* (Hall); *g*, *C. decipiens* Barrande; *h*, *C. inaequalis* Barrande; *i*, *C. scharyi* Barrande; *j*, *C. leptodactylus* (McCoy). *k*, Surface ornamentation of body segment of *C. papilio* Salter. All figures enlarged. For sources of *f*-*k*, see footnote, p. 142.

may also be seen in *C. scharyi* Barrande, *C. inaequalis* Barrande, *C. decipiens* Barrande, etc., and in some British species, particularly in *C. leptodactylus* (McCoy), *C. stygia* Salter, and *C. gigas* Salter. The writer is unable to state the true significance of these ornamentations, but, since none of them are exactly alike, it seems entirely probable that they may have some value as specific characters. If such be the case, it would appear that comparative studies of these ornamentations might form a more precise means for specific differentiations. It should, however, be borne in mind that although the ornamentations of the basal end of telsons are frequently identical with those of body segments of the same species they are not always so, a fact which must be considered while dealing with identifications of isolated body segments on the basis of surface ornamentations.

The distal end of the central spine (style) is concealed beneath the matrix. Thus, neither the entire length of the spine nor the nature of tapering of its distal extremity can be accurately ascertained. The two smaller lateral spines or stylets (cercopods), except their distal extremities, have, due to some extraneous force, come into close proximity and appear to have been pressed over the style, nearly overlapping it. The stylets in proportion to the style are unusually long and narrow and gently tapering from the point of articulation to within a short distance of their distal extremities, where they taper abruptly in the form of a knife-blade. The stylets are also ribbed and grooved in very much the same way as the style. No other ornamentation on this surface has been observed.

DIMENSIONS

	MM.
Length of specimen (as far as preserved)	63
Width at extreme proximal portion	7
Width of proximal portion at line of articulation of stylets to style . .	9
Width at distal extremity of style (as far as preserved)	3
Width at distal extremities of stylets	4
Length of stylets	40

Remarks.—At first sight the specimen gives the impression of a spine of the acanthodian genus, *Onchus*, rather than a telson-spine of a *Ceratiocaris*. This is chiefly because the stylets cannot be seen readily. It may, however, be mentioned here that even if the stylets were not preserved, it would have been difficult to refer the present species to *Onchus*. The fragility, the thinness, and the absence of a rigid anterior border of the spine under discussion are not characters usually to be expected of a shark spine. Moreover, acanthodian spines, due to their composition, are not likely to carbonize as readily and in the same manner as would a chitinous

spine such as that of a *Ceratiocaris*. Finally, the presence of the stylets and of the peculiar ornamentations on the basal end of this spine remove all doubt as to its being anything but a telson-spine of a *Ceratiocaris*.

Comparative studies fully confirm that the present specimen is not referable to any described species of the genus. Of the few Silurian *Ceratiocaris* known in North America, only one species, *C. deweyi* (Hall), which is also the only other Niagaran species hitherto reported, may be cited here as possessing certain features in common with *C. markhami* Roy. These common features, i.e., the general form and the parallel, longitudinal ribbing and grooving, however, have no particular significance. They only give the two species a superficial similarity. The differences, on the contrary, are of greater import and they readily distinguish the spine of *C. markhami* from that of *C. deweyi*. The former is smaller and much less gradually tapering, has ribs that are striated and proportionately flatter and less elevated, and grooves that are narrower and shallower. Furthermore, the ornamentations on the basal end of the two spines are not alike. The stylets of *C. deweyi* are not known, and, therefore, cannot be compared with those of *C. markhami*. It is, however, pertinent to mention here that the stylets of *C. markhami*, when compared with those of other species in which they are preserved, give the impression of being unusually long and narrow in proportion to the style, although the validity of such an impression may be questioned, since the entire length of the style of *C. markhami* is not known. Yet the indications are that the style was not much longer and that it ended abruptly in a saber-shaped point like the stylets.

Of the known extra-North American species of *Ceratiocaris*, none may be cited here for direct comparison or for specific relationship with *C. markhami*. Three British species, *C. papilio* Salter, *C. stygia* Salter, and *C. leptodactylus* (McCoy), and two continental species, *C. inaequalis* Barrande and *C. scharyi* Barrande, show certain isolated characters similar to the corresponding characters of *C. markhami*, but these similarities are not constant to a species, and, therefore, are not deserving of special consideration.

The specific name is in honor of the donor, Mr. Floyd Markham.

Horizon and locality.—Lecthaylus shale, Upper Lockport group (Niagaran), Blue Island, Illinois.

Collector.—Floyd Markham.

No. P23506 Field Museum.

Holotype and topotype.

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